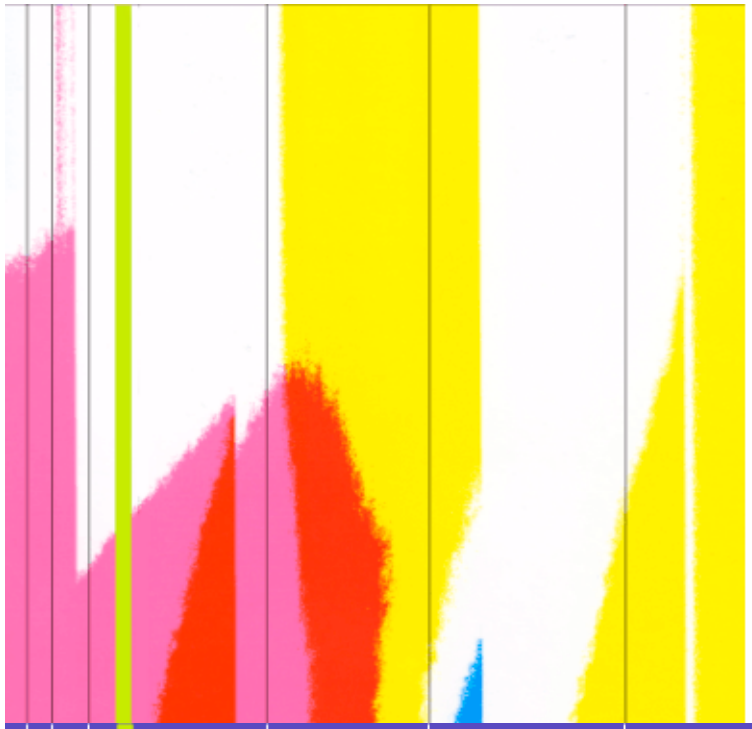

# Non-US Issues in Supercomputing

Christine Morin
IRISA/INRIA, Rennes (France)

SOS10 panel - Maui, Haw aii (USA), March 8th, 2006

INSTITUT NATIONAL
DE RECHERCHE
EN INFORMATIQUE
ET EN AUTOMATIQUE

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# Self-introduction

- Guidelines for participants

*"We will assume that everyone will read the supplied bio. There would be no time wasted in lengthy introductions. Instead, self-introduction is strongly encouraged in which you can share some personal information to establish a better rapport with the audience. Share a secret, a hobby, a joke, an embarrassing moment, or an incident."*

- Share an incident
  - Riddle
    - How three missing tables can delay an Air France transatlantic flight for more than 3 hours ?
    - Answer: at the end of the talk

# Questions 1 & 2

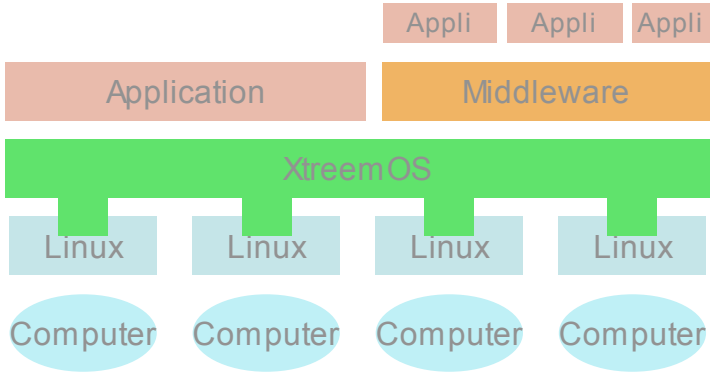

- Supercomputer constructors have nearly disappeared in Europe
  - Bull exception with the CEA machine based on the NovaScale architecture
  - Will there be another success story in the future?
- Lost of expertise in Europe in Supercomputing as a long term side effect
  - Architecture, operating system designers: disappearing species in Europe?
  - How can Europe impact on Supercomputing without local constructors?
- Growing gap between the US and European countries in Supercomputing
  - US
    - Hardware (architects, constructors), computer software (computer scientists) and scientific computing (users)
    - Important role of national labs (*NL) driving supercomputing
  - Europe
    - Computer software and scientific computing

# Question 3: How do you address these issues?

- Europe cannot take a leading role in hardware design for HPC
- Resources for HPC can be provided for a range of applications by
  - Commodity clusters
  - Grid architectures
- Europe can take an important role in software design for HPC on clusters and grid architectures
  - High interest in Grid computing in Europe
    - Aggregating the resources of many geographically distributed computers/clusters rather than building the Top 500 machines
  - Strong expertise in distributed system design in Europe
    - Software design for cluster and grid distributed architectures
- Research programs at the European scale not only at the national level
  - Only mean to get a critical mass and important funding
  - Key for impact

# XtreemOS Project: an OS Approach to Grid Computing

- Project under negotiation in the framework of the FP6 call 5
  - 4 years project, expected starting date: June 2006
- Design, implementation, evaluation & distribution of an open-source Grid operating system based on Linux with native support for virtual organizations




PC, clusters, mobile devices

- Efficient, secure and reliable execution of applications in Grids in the context of VO
- Make the administrators & users work easier

XtreemOS
Enabling Linux for the Grid

INRIA

# XtreemOS Partners

## Coordinator & Project Leader

Caisse des Dépôts

INRIA

## Industrial partners

Mandriva

红旗 Linux

NEC

XLAB RESEARCH

SAP

EADS CCR

EDF

Telefónica Investigación y Desarrollo

## Academic partners

CCLRC Rutherford Appleton Laboratory

ISTITUTO DI SCIENZA E TECNOLOGIE DELL'INFORMAZIONE "A. FAEDO"

ZIB

BSC Barcelona Supercomputing Center Centro Nacional de Supercomputación

ulm university universität ulm

ICT

# Objectives of XtreemOS

- Build a reference open source Grid operating system based on Linux for PC, clusters & mobile devices
- Identify fundamental functionalities to be embedded in Linux to support Virtual Organizations
- Build a set of Grid resource management services for VO
  - Self-healing and scalable OS services for very large numbers of dynamic nodes & users
- Provide a simple Grid OS API compliant with POSIX while adding new functionality & supporting Grid-aware applications
- Validate the design and implementation of the Grid operating system with a set of real use cases (scientific computing, business, finance, virtual world, …)
- Distribute & promote XtreemOS software and create communities of users & developers

# Expected Impact & Results

- Making and keeping Linux as a viable alternative to forthcoming grid-aware versions of proprietary OS
- Technology transfer from the research community to the EU IT industry
- Providing an alternative to Grid middleware to ease the deployment of Grid infrastructures
- Providing a much more stable API compared to existing middleware approaches
- Enabling anyone from SME to large companies to build and operate a Grid infrastructure at minimal cost
- Facilitating access to Grid infrastructure to the end-users

# XtreemOS Flavors

- Standard flavor for PC
  - Grid-aware OS making a PC ready to use in a Grid as part of a VO
- Federation flavor for clusters
  - A cluster = a powerful grid node
  - Single system image OS based on Linux for clusters
    - Based on Kerrighed SSI technology developed by INRIA
- Mobile device flavor for PDAs and mobile phones
  - A mobile device = an access point to grid resources
    - Limited range of services
    - Based on a Linux version for mobile devices

# Question 4: Is there any generality for us all?

- Distributed OS design & implementation for HPC
- Research issues
  - Self-organizing and self-healing operating systems
  - OS support for application fault tolerance
  - Efficient I/O for large amount of data
  - SSI concept
  - Scalability issues

# Riddle: How three missing tables can delay an Air France transatlantic flight for more than 3 hours ?

- Each transatlantic flight to the US requires random checking of passengers between the gate and the plane
- On March 6th, persons in charge of performing these checks for flight AF 072 (Paris-LA) were in place in the corridor with all the required material (detectors, gloves, …) except the tables needed to check the hand luggages
- All passengers were boarded when it was later discovered that the security process was not well implemented
  - The persons in charge of the security in the corridor just did not do their duty and did not inform the gate of the situation (missing tables preventing them to do their job)
- Consequence: all passengers had to come back to the gate with all their belongings and the plane cabin had to be checked again
- Just to make the situation worse, boarding was by bus (Boeing 777 with 240 passengers !)